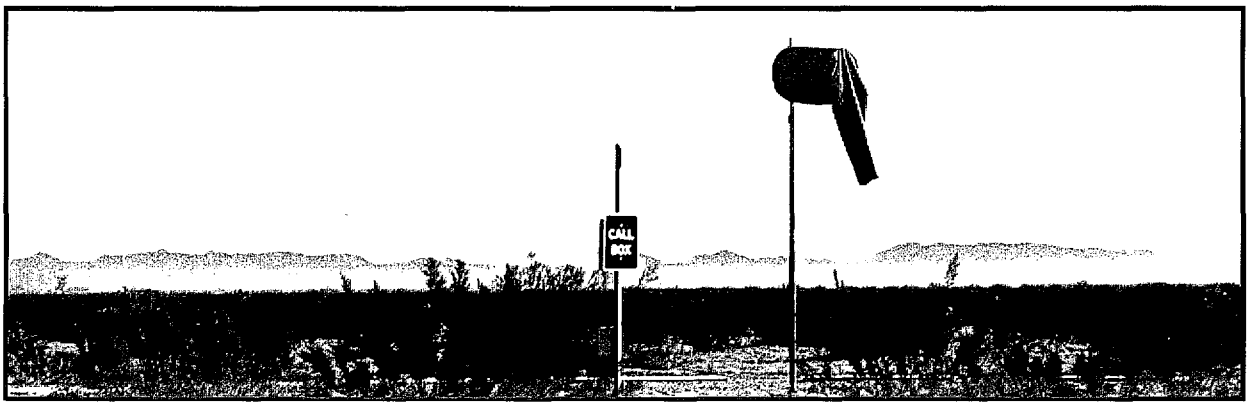
Rolle AIRFIELD

YUMA COUNTY AIRPORT AUTHORITY

Chapter Three
FACILITY REQUIREMENTS

Chapter Three

FACILITY REQUIREMENTS



To properly plan for the future of Rolle Airfield, it is necessary to translate forecasted aviation use into the specific types and quantities of facilities that can adequately serve this identified demand. This chapter uses the results of the forecasting conducted in Chapter Two and establishes planning criteria to determine the airfield (i.e., runways, taxiways, navigational aids, marking and lighting) and landside (i.e., hangars, terminal building, aircraft parking apron, fueling, automobile parking and access) facility requirements.

The objective of this effort is to identify, in general terms, the adequacy of the existing airport facilities and outline what and when new facilities may be needed to accommodate forecasted demands.

Having established these requirements, alternatives for providing the necessary facilities will be evaluated in Chapter Four to determine the most cost-effective and efficient means for implementation.

Recognizing that the need to develop facilities is determined by demand, rather than a point in time, the requirements for new facilities have been expressed for the short, intermediate, and long term planning horizons, which roughly correlate to five-year, ten-year, and twenty-year time frames. Future facility needs will be related to these activity levels rather than a specific year. **Table 3A** summarizes the activity levels that define the planning horizons used in the remainder of this master plan.

TABLE 3A
Planning Horizon Activity Levels

	Short Term Planning Horizon	Intermediate Term Planning Horizon	Long Term Planning Horizon
Based Aircraft	12	14	18
Annual Operations	4,035	4,575	5,710

AIRFIELD REQUIREMENTS

Airfield requirements include the needs for those facilities related to the arrival and departure of aircraft. These facilities comprise the following items:

- Runways
- Taxiways
- Navigational Aids
- Airfield Marking and Lighting

The following sections describe the scope of facilities that would be necessary to accommodate the airport's forecasted role throughout the planning period.

AIRFIELD DESIGN STANDARDS

The selection of the appropriate FAA design standards for the development of the airfield facilities is based primarily upon the characteristics of the aircraft that are expected to use the airport. The most critical characteristics are the **approach speed** and **wingspan** of the **critical design aircraft** anticipated to use the airport now and in the future. The critical design aircraft is defined as the most demanding category of aircraft that conducts 500 or more operations per year. Planning for future aircraft use is of particular importance since design standards are used to plan separation distances between facilities. Appropriately locating these airfield facilities now, reduces/eliminates the need to relocate them in the future, which would be an expensive endeavor.

The FAA has established criteria for use in the sizing and design of airfield facilities. These standards include criteria which relate to aircraft size and performance. According to FAA Advisory Circular (AC) 150/5300-13, *Airport Design,* an aircraft's approach category is based upon 1.3 times its stall speed in landing configuration at the aircraft's maximum certificated weight. The five approach categories used in airport planning are as follows:

Category A: Speeds of less than 91 knots.

Category B: Speeds of 91 knots or more, but less than 121 knots.

Category C: Speeds of 121 knots or more, but less than 141 knots.

Category D: Speeds of 141 knots or more, but less than 166 knots.

Category E: Speeds of 166 knots or more.

The second basic design criteria relates to aircraft size. The Airplane Design Group **(ADG)** is based upon wingspan. The six groups are as follows:

Group I: Up to but not including 49 feet.

Group II: 49 feet up to but not including 79 feet.

Group III: 79 feet up to but not including 118 feet.

Group IV: 118 feet up to but not including 171 feet.

Group V: 171 feet up to but not including 214 feet.

Group VI: 214 feet or greater.

Together, approach category and ADG

identify a coding system whereby airport design criteria are related to the operational and physical characteristics of the aircraft intended to operate at the airport. This code, the **Airport Reference Code** (ARC), has two components: the first, depicted by a letter, is the aircraft approach category; the second, is the airplane design group. Generally, aircraft approach speed applies to runways and runway-related facilities, while airplane wingspan primarily relates to separation criteria involving taxiways and taxilanes. **Table 3B** provides a listing of typical aircraft including their Airport Reference Code, approach speed, wingspan, and maximum takeoff weight.

The FAA advises designing airfield elements to meet the requirements of the airport's most demanding or critical aircraft. As previously discussed, this is the aircraft or group of aircraft expected to perform 500 or more operations per year. In order to determine facility requirements, the ARC of the airport should first be determined, then appropriate airport design criteria can be applied.

Rolle Airfield's current ARC is B-I, however, forecasts conducted in Chapter Two indicate the Airfield will most likely have an ARC B-II classification by the end of the planning horizon. As noted in the previous two chapters, presently there are no based aircraft at Rolle Airfield. Additionally, the Airfield is used primarily for student pilot training utilizing mainly single engine, piston-powered aircraft performing standard training maneuvers such as touch-and-go's, etc.. For the immediate future, it is assumed that flight training will continue to be the main role of the Airfield. Given the expected continuation of the economic and population expansion of the San Luis area, however, the extended forecasts call for increases in the number of potential based aircraft as well as a more varied fleet mix.

In the future, ARC B-II aircraft weighing 12,500 pounds or more would be the most demanding type of aircraft operating at Rolle Airfield. This design classification includes the twin turboprop Beech Super King Air 300, Cessna 441 Conquest as well as the Cessna Citation and Dassault Falcon series of business jet aircraft. These aircraft comprise the majority of active business aircraft and are the most cost-effective for corporations to own and operate. Most likely, the Airfield's present ARC B-I is adequate for the short-term planning horizon, however, the extended future airside and landside facilities planning should consider FAA design criteria for ARC B-II.

Airfield Capacity

A demand/capacity analysis measures the capacity of the airfield facilities (i.e., runways and taxiways) in order to identify and plan for additional development needs. The capacity of the airfield is affected by several factors including airfield layout, meteorological conditions, aircraft mix, runway use, aircraft arrivals, aircraft touch-and-go activity, and exit taxiway locations. An airport's airfield capacity is expressed in terms of its annual service volume. Annual service volume is a reasonable estimate of the maximum level of aircraft operations that can be accommodated in a year with limited levels of delay.

TABLE 3B
Representative General Aviation Aircraft by Airport Reference Code

Airport Reference Code	Typical Aircraft	Approach Speed (knots)	Wingspan (feet)	Maximum Takeoff Weight (lbs.)
	Single-Engine Piston			
A-I	Cessna 150	55	32.7	1,600
A-I	Cessna 172	64	35.8	2,300
A-I	Beechcraft Bonanza	75	37.8	3,850
	Multi-Engine Piston			
B-I	Beechcraft Baron 58	96	37.8	5,500
B-I	Piper Navajo	100	40.7	6,200
B-I	Cessna 421	96	41.7	7,450
	Turboprop			
B-I	Mitsubishi MU-2	119	39.2	10,800
B-I	Piper Cheyenne	119	47.7	12,050
B-I	Beechcraft King Air B-100	111	45.8	11,800
	Business Jets			
B-I	Cessna Citation I	108	47.1	11,850
B-I	Falcon 10	104	42.9	18,740
	Turboprop			
B-II	Beechcraft Super King Air	103	54.5	12,500
B-II	Cessna 441	100	49.3	9,925
	Business Jets			
B-II	Cessna Citation II	108	51.7	13,330
B-II	Cessna Citation III	114	53.5	22,000
B-II	Falcon 20	107	53.5	28,660
B-II	Falcon 900	100	63.4	45,500
	Business Jets			
C-I	Learjet 55	128	43.7	21,500
C-I	Rockwell Sabre 75A	137	44.5	23,300
C-I	Learjet 25	137	35.6	15,000
	Turboprop			
C-II	Rockwell 980	121	52.1	10,325
	Business Jets			
C-II	Canadair Challenger	125	61.8	41,250
C-II	Gulfstream III	136	77.8	69,700
	Business Jets			
D-I	Learjet 35	143	39.5	18,300
D-II	Gulfstream II	141	68.8	65,300
D-II	Gulfstream IV	145	78.8	71,780

According to FAA guidelines detailed in FAA Advisory Circular 150/5060-5, *Airport Capacity and Delay*, the annual service volume of a single runway configuration

comparable to Rolle Airfield normally exceeds 230,000 operations. Since the forecasts for the Airfield indicate that activity through the planning horizon will remain well below 230,000 annual operations, the capacity of the existing airfield (runway) system will not be reached and the existing single runway configuration can meet operational demands. The facility requirements analysis will focus, therefore, on developing those facilities which will improve safety and service concerns rather than demand/capacity needs.

RUNWAYS

The adequacy of the existing runway has been analyzed from a number of perspectives including runway orientation, runway length, runway width, and pavement strength. From these analyses, requirements for runway improvements have been determined for the airport.

Runway Orientation

Wind conditions are the prime element in determining runway orientation. When prevailing winds are consistently from one direction, runways are generally oriented in that direction. In most areas, however, consistency of wind direction is not found. In these circumstances, a multiple runway configuration may be required. The FAA has established guidelines recommending that an airport's runway system should provide 95 percent usability of the airfield. This 95 percent wind coverage is based upon the crosswind not exceeding 10.5 knots (12 mph) for ARC's A-I and B-I; 13 knots (15 mph) for ARC's A-II and B-II; and 16 knots (18 mph) or ARC's C-I through D-II.

Rolle Airfield is currently served by a single runway, Runway 17-35, which is oriented in a north-south direction. Presently, there is no specific wind data available for Rolle Airfield, therefore, the runway orientation analysis was performed using wind data from nearby Yuma International Airport encompassing the years 1987 through 1996. The results of this runway orientation analysis are illustrated on **Exhibit 1F, All Weather Wind Rose** in Chapter One. As the table on this exhibit indicates, Runway 17-35 exceeds the minimum FAA requirements (95 percent) for wind coverage in both the 10.5 knot (12 mph) range and the 13 knots (15 mph) category, therefore, negating the necessity of a future crosswind runway.

Runway Length

The determination of runway length requirements for an airport are based upon five primary factors:

- Airport elevation
- Mean maximum temperature of the hottest month
- Runway gradient (elevation differences between each runway end)
- Critical aircraft type expected to use the airport
- Stage length of the longest nonstop trip destinations.

As discussed in Chapter One, for the San Luis area, the average maximum daily temperature of the hottest month (July) is 106.3 degrees (F). The elevation of Rolle Airfield is 163 feet MSL (above mean sea level), and the runway gradient for Runway 17-35 is 0.01 percent for a difference in elevation of 0.3 feet between each runway end. It should be noted that aircraft performance declines as elevation, temperature, and runway gradient factors

increase.

Based on these five primary factors, **Table 3C** outlines the runway length requirements for the various classes of aircraft projected to utilize the runway at Rolle Airfield throughout the planning period. Runway 17-35's existing length of 2,800 feet is capable of accommodating 75 percent of small aircraft with less than ten passenger seats. This runway length is adequate for the current ARC B-I classification, however, for ARC B-II, a runway length of 5,000 feet is recommended by the conclusion of the long-term planning horizon. If necessary or so desired, this 2,200 foot runway extension could be accomplished in stages. The recommended minimum initial stage runway extension would be 510 feet for a total interim length of 3,310 feet thus allowing the Airfield to accommodate 95 percent of small aircraft (12,500 pounds or less) with less than ten passenger seats. On the other hand, the recommended long-term planning horizon runway length of 5,000 would accommodate 75 percent of large airplanes of 60,000 pounds or less at 60 percent of their useful load. These requirements were derived from the FAA Airport Design computer program (Version 4.2D). As with other design criteria, runway length requirements are based upon the critical aircraft grouping.

TABLE 3C
Runway Length Requirements

AIRPORT AND RUNWAY DATA	
Airport elevation	163 feet
Mean daily maximum temperature of the hottest month	106.3 F
Maximum difference in runway centerline elevation	0.3 feet
RUNWAY LENGTHS RECOMMENDED FOR AIRPORT DESIGN	
Small airplanes with approach speeds of less than 30 knots	300 feet
Small airplanes with approach speeds of less than 50 knots	810 feet
Small airplanes with less than 10 passenger seats	
75 percent of these small planes	2,730 feet
95 percent of these small planes	**3,310 feet**
100 percent of these small planes	3,930 feet
Small airplanes with 10 or more passenger seats	**4,580 feet**
Large airplanes of 60,000 pounds or less	
75 percent of these planes at 60 percent useful load	**4,960 feet**
100 percent of these planes at 60 percent useful load	8,180 feet
Airplanes of more than 60,000 pounds	5,070feet

Source: FAA Airport Design computer program Version 4.2A.

Runway Width

Runway 17-35 is presently 60 feet wide, which meets the current B-I runway width requirement. ARC B-II design criteria, however, specifies a runway width of 75 feet. Widening of this runway to 75 feet should be planned and coordinated with the recommended runway extension regardless of whether the runway is extended in stages or

not.

Runway Pavement Strength

The current edition of the *Airport/Facility Directory, Southwest U.S., 30 Dec 1999 to 24 Feb 2000* shows no published runway strength rating for Runway 17-35. The previous Airport Layout Plan (ALP) drawing discussed in Chapter One, however, indicates Runway 17-35 has a pavement strength rating of 8,000 pounds single-wheel gear loading (SWL). Given the current nature of operations at the Airfield this rating is adequate. Should the runway be extended in stages (interim length 3,310 feet) it is recommended the pavement strength rating be increased to12,500 pounds single-wheel gear loading (SWL). The larger ARC B-II corporate type aircraft, however, which are projected to use the Airfield in the future could weigh up to 30,000 pounds in a dual-wheel gear (DWL) configuration. Future planning, therefore, should incorporate ultimately strengthening this runway to 30,000 pounds DWL. This upgrade to the pavement strength of Runway 17-35 could be integrated with the recommended runway lengthening and widening projects discussed previously.

Taxiways

Taxiways are primarily constructed to facilitate aircraft movements to and from the runway system. Parallel taxiways in particular serve to enhance airfield capacity and are extremely essential to aircraft movement about an airfield. Some taxiways are necessary simply to provide access between the aprons and runways, whereas other taxiways become necessary as activity increases at an airport in order to provide safe and efficient use of the airfield. Three crucial elements involved in taxiway design are: taxiway width, separation distance between runways and parallel taxiways, and pavement strength rating.

As previously discussed, there are presently no based aircraft or storage facilities at Rolle Airfield, hence, there are no active taxiways either. The previously mentioned, military-era taxiway has long since been abandoned. Two paved turnouts/holding aprons, however, are available on the runway's west side at each runway end.

Given the Airfield's current and projected activity levels, a single, mid-field taxiway connecting the runway to the future proposed aircraft parking apron is recommended for the short and mid-term planning horizons. This connecting taxiway would be 35 feet in width with a pavement strength rating equal to that of Runway 17-35. This taxiway/runway configuration would allow departing aircraft to "back taxi" to the desired departure runway end and, if necessary, utilize either of the two holding aprons discussed earlier. Additionally, these aprons provide aircraft with an area to conduct final checks prior to takeoff. An aircraft unable to takeoff due to a malfunction can be bypassed here by other aircraft ready for takeoff. Generally, such aprons are designed large enough to accommodate from two to four aircraft, which is dependent on the average size of aircraft utilizing the runway. Furthermore, the existing holding aprons shall be relocated in conjunction with any interim or ultimate runway lengthening.

By the conclusion of the long-term planning horizon, in order to enhance and maintain the efficiency of the ultimate 5,000 foot length of Runway 17-35, a full-length parallel taxiway and its connecting stubs should be

constructed. Like the upgraded runway, this taxiway system must meet the ultimate ARC B-II design criteria with regard to width and runway-taxiway separation distance. ARC B-II design standards specify a taxiway width of 35 feet and runway-taxiway separation of 240 feet.

Further considerations with regard to future taxiway improvements include marking, lighting and signage. These items enhance both the safety and efficient movement of aircraft to and from the runway system. Future planning requirements regarding taxiway marking, lighting and signage are addressed in the section dealing with runway/taxiway marking and lighting which follows later in this chapter.

NAVIGATIONAL AIDS

Electronic navigational aids are used by aircraft during an approach to an airport. Instrument approach procedures are a series of maneuvers designed by the FAA which utilize navigational aids to assist pilots in locating and landing at an airport and are especially helpful during inclement weather conditions. Additionally, pilots often use instrument approaches during good visibility conditions. Currently, there are no instrument approaches available at Rolle Airfield. Having no instrument approaches means that the airport is effectively closed during poor weather situations when visual flight can no longer be attempted. The closest public use airport providing instrument approach capability is Yuma International Airport-MCAS (10 nautical miles northeast).

Nationwide, the increased use of general aviation aircraft for business and corporate aircraft has elevated the need for instrument approaches at noncommercial airports. In order to support this growing segment of general aviation as well as provide convenient local air access to San Luis and other surrounding communities, it is vital that Rolle Airfield is accessible in all weather conditions and that weather-related down time at the airport be reduced. The advent of Global Positioning System (GPS) technology will ultimately provide the capability of establishing instrument approaches at the Airfield. As discussed in Chapter One, the FAA is proceeding with a program to transition from existing, ground-based navigational aids to a satellite-based navigation system utilizing GPS technology.

Currently, GPS is certified for enroute guidance and for use with instrument approach procedures. The initial GPS approaches being developed by the FAA provide only course guidance information. In the near future, it is expected that GPS will also be certified for use in providing descent information for an instrument approach. Currently, this capability is only available using an Instrument Landing System (ILS). Presently, there are three categories of GPS approaches, each based upon the desired visibility minimum of the approach. The three categories of GPS approaches are: one-half mile, three-quarter mile, and one mile. To be eligible for a GPS approach, the airport landing surfaces must meet specific standards as outlined in Appendix 16 of the FAA Airport Design Circular. The specific airport landing surface requirements which must be met in order to establish a GPS approach and a comparison of these standards to existing airport facilities is summarized in **Table 3D**. Currently, Rolle Airfield lacks the required low intensity runway edge lighting and primary surface clearance standards required to support a GPS approach. The *Navigational Aids and Aviation Special Services Study* released in March 1999 by the Aeronautics

Division of ADOT, however, recommends and supports the establishment of a one-mile GPS approach to Runway 17 at Rolle Airfield. Facility planning, therefore, will proceed under the assumption that the GPS approach will be approved and implemented within the short to mid-term planning horizon.

TABLE 3D
GPS Instrument Approach Requirements

Requirement	One-Half Mile Visibility	3/4-Mile Visibility Greater Than 300-Foot Cloud Ceiling	One-Mile Visibility Greater Than 400-Foot Cloud Ceiling	Existing Conditions Runway 17-35
Minimum Runway Length	4,200 Feet	3,500 Feet	2,400 Feet	2,800 Feet
Runway Markings	Precision	Nonprecision	Visual	Visual
Runway Edge Lighting	Medium Intensity	Medium Intensity	Low Intensity	None
Approach Lighting	MALSR	ODALS Recommended	Not Required	None
Primary Surface	500 feet clearance on each side of runway	500 feet clearance on each side of runway	250 feet clearance on each side of runway	125 feet clearance on each side of runways

Source: Appendix 16, FAA AC 150/5300-13, Airport Design, Change 5
MALSR - Medium intensity Approach Lighting System with Runway Alignment Lighting
ODALS - Omni-directional Approach Lighting System

As reflected in the table, the existing Runway 17-35 could support a one mile visibility minimum GPS approach by installing low intensity runway edge lighting and by increasing the total width of the existing primary surface from 250 feet to the required minimum of 500 feet. Other than vegetation, there are no obstructions within the required primary surface area which would need to be removed. It is, however, recommended that the previously discussed 300-foot wide oiled area left over from the Airfield's military period be analyzed from an engineering standpoint, and either stabilized or removed. Finally, the establishment of any future GPS approach will require coordination with the appropriate military jurisdictions as Rolle Airfield Airport is located within special-use military air space (Dome MOA).

AIRFIELD LIGHTING, PAVEMENT MARKINGS AND WIND INDICATORS

Airfield lighting and pavement markings assist pilots in locating an airport at night and in poor weather conditions as well as facilitate aircraft movement on the ground. The current and future requirements for each of these components at Rolle Airfield are summarized below.

Identification Lighting: Usually, the location and presence of an airport at night is indicated by the rotating airport beacon. As Rolle Airfield is a daytime use only airport, currently there is no beacon located at the Airfield. In order to facilitate night time operations, future planning should include the installation of an airport beacon. A standard rotating beacon is equipped with an optical system that alternately projects two beams of light, one green and one white, 180 degrees apart. Specifications, installation, and location of the airport rotating beacon shall conform to *FAA Advisory Circulars (AC) 150/5340-21 and 170/6850-1.*

Visual Approach Lighting: Visual approach lighting systems are configurations of lights which are positioned symmetrically along the extended runway centerline and extend towards the approach. There are no existing approach lighting systems currently located at Rolle Airfield. **Table 3D** indicates that an approach lighting system is not required for the implementation of the recommended one-mile visibility minimum GPS approach to Runway 17. This condition is adequate with regard to the recommended airside improvements presented in this report.

Visual Approach Aids: Visual glide slope indicators (VGSI) are a system of lights located at the side of the runway and provide visual descent guidance information to pilots during an approach to the runway. As discussed in Chapter One there are no VGSIs available at Rolle Airfield. PAPI-2s (precision approach path indicator) are recommended for each end of Runway 17-35.

Runway Lighting: The purpose of runway edge lighting at an airport is to provide an outline of the runway thus enabling both nighttime and low visibility operations. At present, runway edge lighting is not available at Rolle Airfield. As discussed previously in the section on Navigational Aids, one requirement for a one-mile GPS approach is the presence of low intensity runway edge lighting (LIRL). Future planning should, therefore, include the implementation of a LIRL system to be coordinated along with the installation of runway threshold lighting delineating the thresholds for Runway 17-35.

Taxiway Lighting: Taxiway lighting or illumination at an airport increases the safety and efficiency of aircraft ground movement operations at night. There are no existing taxiways at Rolle Airfield. The proposed (short/mid-term planning horizons) single, mid-field taxiway connecting the runway to the future aircraft parking apron could be adequately served by taxiway reflectors delineating the taxiway centerline and edges. Low intensity taxiway lighting (LITL), however, is recommended for the proposed full-length parallel taxiway and related exit stubs which are to be constructed by the end of the long term planning horizon.

Runway/Taxiway Pavement Markings: The current basic pavement markings on Runway 17-35 identify the runway centerline and numerical designation. Additionally, aircraft holding positions are delineated on the turnout/holding aprons located at each runway end. Non-standard markings delineate the helipad located near the Runway 35 end. Furthermore, painted yellow crosses indicating the closed runway and taxiways are visible on or near the intersections of the active and closed runway/taxiway surfaces. These markings are all in fair condition. Extending Runway 17-35 will require reapplication of the basic centerline and runway designation markings as well as the holding positions for the previously discussed aircraft turnout areas. All future taxiways will

require both centerline and pavement edge marking. Additionally, it is recommended that the aforementioned helipad be redesignated with FAA standard helipad markings, and that all closed runway/taxiway markings be retained and/or reapplied where and when necessary.

Wind Indicators: Wind indicating devices provide pilots with information as to ground-level wind conditions, while segmented circles indicate airport traffic patterns. It is recommended that the segmented circle/wind cone located east of Runway 17-35 be upgraded to a lighted wind device for nighttime operations. In addition, supplemental wind cones are recommended for installation at or near each ultimate runway end.

CONCLUSIONS

A summary of the airfield facility requirements for Rolle Airfield is presented in **Exhibit 3A.** As discussed earlier, the proposed ultimate length for Runway 17-35 is 5,000 feet, and could be completed all at once or in stages. As a minimum, the short term planning recommendations propose extending Runway 17-35 510 feet to an interim length of 3,310 feet, widening the runway to 75 feet, and increasing the current 8,000 pounds SWL pavement strength to a minimum 12,500 pounds SWL. In conjunction with the full extension of Runway 17-35 to its final length, the ultimate runway pavement strength would be increased to 30,000 pounds DWL. The proposed 75-foot runway width is adequate for the type of aircraft projected to utilize the Airfield throughout the 20-year planning horizon. In addition, a one-mile visibility minimum GPS approach to Runway 17 should be implemented as soon as the necessary improvements (install LIRL and widen primary surface) to support this approach are completed. PAPI-2 visual approach lighting which provide descent guidance information upon runway approach are proposed for each end of Runway 17-35. Furthermore, runway threshold lights delineating each runway end are also recommended in order to facilitate nighttime and poor visibility operations. Additional planning considerations, which compliment these improvements to Runway 17-35 include installation of an airport rotating beacon, an initial mid-field exit taxiway connecting to the proposed aircraft parking apron, relocation of the holding aprons to the extended runway ends, and an eventual (long term planning horizon) full-length parallel taxiway. Taxiway improvements recommended to improve both the safety and efficiency of aircraft ground movements include marking, illumination, and signage when and where applicable.

LANDSIDE REQUIREMENTS

Landside facilities are those necessary for handling of aircraft and passengers while on the ground. These facilities provide the essential interface between the air and ground transportation modes. The capacities of the various components of each area were examined in relation to projected demand to identify future landside facility needs.

AIRCRAFT STORAGE FACILITIES

The space required for hangar facilities is dependent upon the number and type of aircraft expected to be based at the Airfield. Potential based aircraft numbers for Rolle Airfield are based on forecasts conducted in Chapter Two. The percentage of aircraft to be hangared varies from airport to airport,

depending upon local climatic conditions, owner preferences and airport security. In Arizona, at airports where hangar facilities are available, demand for hangars ranges from 60 to 80 percent. For planning purposes, due to Rolle Airfield's somewhat remote location (security issue) and the nature of the area's climate (blowing dust/sand and intense summer heat), it is assumed that approximately 90 percent of all potential based aircraft owners will desire hangar facilities.

The type of hangar, either T-Hangar, shade hangar or conventional hangar, was also determined for the Airfield. Besides being less expensive to construct than conventional hangars, T-hangars provide aircraft owners with more privacy and security while allowing easier access to their aircraft. Conversely, shade hangars (covered tie-downs) offer limited protection from the weather and are not as secure as enclosed T-hangars. The principal uses of conventional hangars at general aviation airports are for large aircraft storage, aircraft storage during maintenance, and for housing fixed based operator (FBO) activities.

Given the Airfield's somewhat limited potential for a large number of future based aircraft along with the forecast transient aircraft population, the establishment of a market for a Fixed Based Operator (FBO), with the expense of constructing a large conventional hangar facility cannot be currently justified. Should demand for this type of a multi-service FBO operation develop during the planning period, however, a site for such a conventional hangar facility should be identified within the 20-year planning horizon.

Due to the previously stated factors regarding both climatic and security limitations, proposed aircraft storage facilities at Rolle Airfield should consist of T-hangars and not T-shade hangars. The majority of the forecast potential based aircraft (single engine) will require T-hangar facilities, however, four other types of potential based aircraft identified in Chapter Two could be large enough to warrant the eventual construction of a conventional or corporate hangar storage facility. With regard to this potential, an area should be designated for possible future corporate hangar location(s). Estimated future hangar requirements for Rolle Airfield are presented in **Table 3E**. A planning standard of 1,200 square feet per based aircraft stored in T-hangars has been used to determine future T-hangar requirements. Due to the initial nature of operations and potential based aircraft types, conventional hangar space estimates/requirements are reserved for the long term planning horizon only. For a future conventional hangar facility or FBO facility, a planning standard of 2,500 square feet per based aircraft has been used. Additionally, the requirements for potential conventional hangar space was increased by 15 percent to account for future aircraft maintenance needs.

99MP11-3A-6/16/00

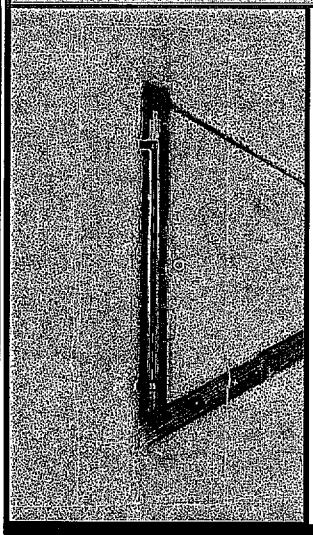
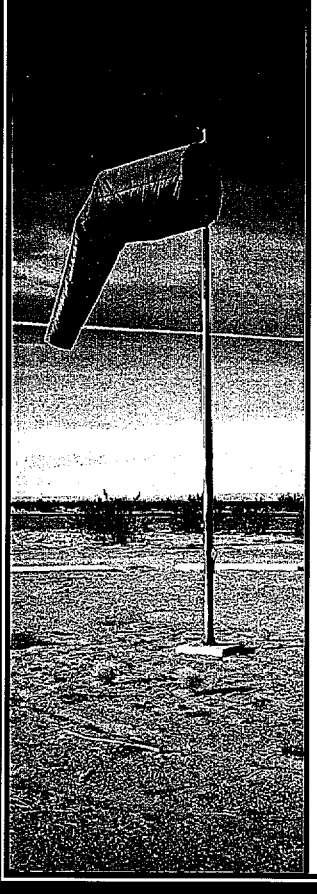
	EXISTING	SHORT TERM NEED	LONG TERM NEED
RUNWAYS AND TAXIWAYS			
	**Runway 17-35** 2800' x 60' 8,000 lbs. SWL Two Paved Turnouts/ Holding Aprons (At Each Runway End on West Side) Helipad	**Runway 17-35** 3310' x 75' 12,500 lbs. SWL Relocated Same **Taxiway** Single, Mid-Field Connecting 35' Taxiway	**Runway 17-35** 5000' x 75' 30,000 lbs. DWL Relocated Same **Taxiways** Same Full-length 35' Parallel Taxiway and Connecting Stubs
NAVIGATIONAL AIDS, AIRFIELD LIGHTING, AND MARKING			
	**Runway 17-35** Basic Runway Markings (Visual) **Helipad** Non-standard Markings Segmented Circle/ Wind Cone	**Runway 17-35** Same Medium Intensity Runway Lighting (MIRL) Runway Threshold Lights Global Positioning System Approach to Runway 17 PAPI-2's Runways 17 & 35 **Helipad** Standard Markings **Taxiway** Centerline/Edge Marking Centerline/Edge Reflectors on Mid-Field Taxiway Lighted Wind Device Rotating Beacon	**Runway 17-35** Same Same Same Same Same **Helipad** Same **Taxiways** Same Same Centerline/Edge Marking Medium Intensity Taxiway Lighting (MITL) on Parallel Taxiway & Connecting Stubs Same Wind Cones at Runways 17 & 35 Same

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Exhibit 3A
AIRFIELD REQUIREMENTS

TABLE 3E Aircraft Storage Hangar Requirements			
	Future Requirements		
	Short Term	Intermediate Term	Long Term
Potential Aircraft to be Hangared	12	14	18
T-Hangar/Shade Hangar Units or Positions	11	12	14
Conventional Hangar Positions	0	0	2
T-Hangar Area (s.f.)	13,200	14,400	16,800
Conventional Hangar Area (s.f.)	0	0	5,750
Total Hangar Area (s.f.)	13,200	14,400	22,550

AIRCRAFT PARKING APRONS

At a typical airport, a parking apron should be provided for at least the number of locally-based aircraft that are not stored in hangars, as well as transient aircraft. Since presently, Rolle Airfield has no based aircraft or aircraft storage facilities all required facilities are based on the potential for future based aircraft and projected transient aircraft operations numbers. Any proposed tiedown area must be designed to accommodate both single and twin-engine GA aircraft, and be located conveniently for both local and transient aircraft use. The number of tiedowns required is based on the number of potential based aircraft as well as an estimated percentage of transient aircraft requiring tiedown space. As stated earlier, due to climatic and security issues, it is believed that the majority (±90 percent) of based aircraft owners will desire enclosed hangar storage facilities. In order to estimate the number of itinerant spaces required, it was determined that approximately 20 percent of busy day itinerant operations would require a tiedown position. Furthermore, due to other mitigating factors, some intuitive judgement has been applied as the final calculated number of tiedowns required has been adjusted slightly upwards. Finally, for future planning purposes, due to the fact that all estimates are based solely on future potential regarding both based aircraft and itinerant operations, the number of transient and local tiedown positions required have been combined into a single total estimate. In determining future total apron area requirements, a planning criterion of 570 square yards per aircraft parking position was used for both local and transient aircraft. Future apron requirements with regard to the total number of tie-down positions and total apron area is presented in **Table 3F**

TABLE 3F
Aircraft Parking Apron Requirements

	Future Requirements		
	Short Term	**Intermediate Term**	**Long Term**
Total Combined Local and Transient Tie-down Positions	2	4	6
Total Combined Local and Transient Aircraft Parking (Tie-downs) Apron Area (s.y.)	1,140	2,280	3,420

GENERAL AVIATION TERMINAL FACILITIES

General aviation (GA) terminal facilities serve several functions at an airport. These functions can include providing passenger waiting areas, a pilot's lounge and flight planning area, restrooms, food and beverage concessions, administrative and management offices, storage plus various other needs. As noted in Chapter One, there are no existing structures or buildings at Rolle Airfield, therefore, there is currently no way to support any of the above mentioned functions.

The methodology used in estimating an airport's general aviation terminal facility needs are based on the number of airport users expected to utilize general aviation facilities during the design hour. Future space requirements are then based upon providing 90 square feet per design hour itinerant passenger. **Table 3G** outlines these future requirements for general aviation terminal services at Rolle Airfield throughout the planning period. With regard to most GA airports, this space is not necessarily limited to a single building and can be provided by either the airport sponsor or an FBO facility. The planning process for Rolle Airfield should, therefore, include siting of a future general aviation terminal facility area, in order to ensure that an adequate facility is available. Until such time as demand warrants construction of such dedicated GA terminal facilities many of the necessary basic functions (restrooms, potable water, storage, etc.) can be provided within the proposed hangar storage facilities.

TABLE 3G
Terminal Facility Requirements

	Future Requirements		
	Short Term	**Intermediate Term**	**Long Term**
Design Hour Passengers	4	4	8
Building Space (s.f.)	360	360	820

AVIATION SUPPORT FACILITIES

Certain facilities that do not logically fall under classifications of airfield, terminal building, or general aviation have been identified for inclusion within this Master Plan. Facility requirements, where applicable, have been identified for the following facilities:

- Airport Access and Vehicle Parking
- Fuel Storage
- Aircraft Wash Rack/Maintenance Facility
- Public Utilities
- Other Facilities

AIRPORT ACCESS AND VEHICLE PARKING

As discussed in Chapter One, Rolle Airfield is located in southwestern Yuma County on land recently annexed by the City of San Luis (June 1999). Regional access to Rolle Airfield is provided mainly by U.S. Highway 95 which is located approximately five (5) miles west, and runs north and south connecting San Luis to the City of Yuma as well as other western Arizona cities located along the Colorado River. Additionally, U.S. 95 intersects Interstate 8 in the City of Yuma. Interstate 8 is an east-west auto and trucking route which extends from Casa Grande north of Tucson to San Diego, California in the west.

Local access from San Luis is provided via County 23rd St. Access from Somerton or Yuma, to the north, is via Avenue B which intersects U.S. 95 east of Somerton and south of the City of Yuma. From either of these points, you must continue on to the Airfield via unimproved (dirt) roads. More specific details regarding driving directions to and from Rolle Airfield are provided in Chapter One. It is recommended that the existing unimproved access road be replaced with a new paved access road configuration consisting of two roads; one, traversing the Airfield property in a north-south direction adjacent to the eastern section line of Section 35; the second road would intersect the first, and be oriented east-to-west, providing access to the vehicle parking area located near the T-Hangar/aircraft parking apron/terminal facility development area.

Access to the Airfield is through the gate located near the end of Runway 17. As was noted in Chapter One, this gate is locked and ground access to the Airfield is restricted without prior approval of the YCAA. In addition, there is no designated vehicle parking area at Rolle Airfield. Automobile parking requirements for future terminal area

activities have been determined using a planning standard of 1.8 spaces per design hour passenger and 400 square feet for each parking position. Additionally, general aviation parking requirements are calculated under the assumption that 20 percent of the based aircraft will require automobile parking at any one time. The parking area required per space is the same that is used in terminal area activities parking requirements. Vehicle parking requirements for Rolle Airfield are presented in **Table 3H**.

TABLE 3H
Vehicle Parking Requirements

	Short Term	Intermediate Term	Long Term
Design Hour Passengers	4	4	8
Terminal Vehicle Spaces	7	7	14
Parking Area (s.f.)	2,800	2,800	5,600
General Aviation Spaces	2	3	4
Parking Area (s.f.)	800	1,200	1,600
Total Airport Parking Spaces	9	10	18
Total Airport Parking Area (s.f.)	3,600	4,000	7,200

FUEL STORAGE

There are no fuel storage or aircraft fueling facilities currently available at Rolle Airfield. Generally, fuel at airports is stored in underground tanks; however, in recent years this practice has undergone a great deal of scrutiny due to the potential for fuel leaks that can lead to the contamination of both soil and groundwater. Accordingly, the design, installation and monitoring requirements from both State and Federal agencies relating to underground fuel storage have increased substantially.

At most airports, fuel storage requirements can vary based upon individual supplies and distributor policies. The recommended fuel storage tank capacity for an airport with the potential number of based aircraft and forecast operations level as Rolle Airfield is 12,000 gallons. This size acknowledges that the capacity of the average fuel delivery truck is 8,000 gallons and given Rolle Airfield's remote location, this amount of storage capacity makes delivery more economically feasible to the delivering fuel supplier. The type of fuel available, such as 100LL or both 100LL and Jet-A, is dependent upon the types of aircraft that would most likely utilize such facilities. The availability of fuel at an airport makes it more attractive and usable to both based aircraft owners and itinerant pilots.

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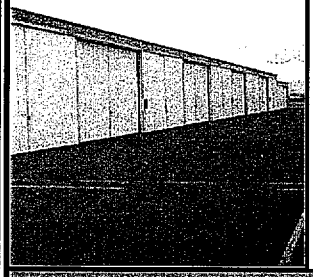
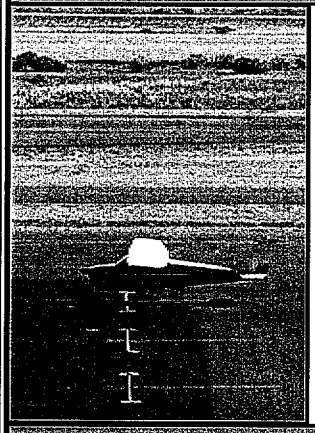
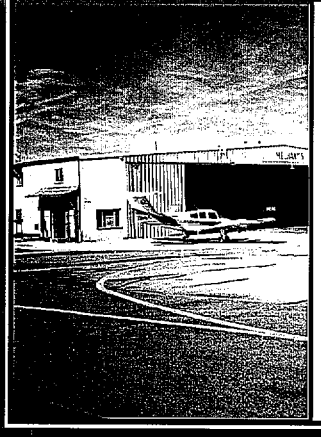
	SHORT TERM NEED	INTERMEDIATE NEED	LONG TERM NEED
AIRCRAFT STORAGE HANGARS			
			
T-Hangar/Shade Units or Positions	11	12	14
Conventional Hangar Positions	0	0	2
T-Hangar Area (s.f.)	13,200	14,400	16,800
Conventional Hangar Area (s.f.)	0	0	5,750
Total Hangar Area (s.f.)	13,200	14,400	22,550
APRON AREA			
			
Total Local/Transient Tie-down Positions	2	4	6
Total Local/Transient Aircraft Parking (Tie-downs) Apron Area (s.y.)	1,140	2,280	3,420
TERMINAL FACILITIES			
			
Building Space (s.f.)	360	360	820
Terminal Vehicle Spaces	7	7	14
General Aviation Spaces	2	3	4
Total Parking Spaces	9	10	18
Total Parking Area (s.f.)	3,600	4,000	7,200

Rolle AIRFIELD
YUMA COUNTY AIRPORT AUTHORITY

Exhibit 3B
LANDSIDE REQUIREMENTS

AIRCRAFT WASH RACK/MAINTENANCE FACILITY

The presence of a designated aircraft wash rack/maintenance facility at an airport offers convenience to the individual aircraft owner and allows the airport sponsor to monitor and maintain their environmental compliance responsibilities. Since it may be sometime before the Airfield can support any type of FBO operation, this combined facility allows a place for those aircraft owners who desire to perform certain cleaning and maintenance functions on their own aircraft. Any proposed facility should be large enough to accommodate Aircraft Design Group 1 aircraft (49 foot wingspan). Additionally, any enclosed or covered structure should include a 20 foot tail height clearance. The location of the aircraft wash rack/maintenance facility should be convenient to both aircraft storage and aircraft parking aprons. Furthermore, this facility should comply with applicable petroleum and waste water recovery/disposal procedures.

PUBLIC UTILITIES

As noted in Chapter One, basic utilities such as electricity, natural gas or propane, water, sewer, and phone service do not currently exist at Rolle Airfield. For reference, a list of the utility providers to the San Luis and Rolle Airfield area is presented in Chapter One. The long-term development of Rolle Airfield is dependent on the development of these lacking facilities.

On-airport uses for water service include potable water, restrooms and fire suppression. It is recommended that future planning include provisions for both a viable water supply and the related water distribution system. Given the Airfields location, two options for water service could be either an on-site or off-site well or on-site water storage tank. The feasibility of either of these systems is based mainly on economics and logistics, and is subject to further study and research which is beyond the scope of this report.

Sanitary sewer service in the form of a septic system should be planned for and implemented in conjunction with the above recommended water utility improvements. Again, given the Airfield's location, providing sewer service is a matter of economics and logistics, but in this case it is clear that a septic system would be the easiest to implement and also offer the most cost effective solution. The design of the septic system must be flexible with regard to future Airfield expansion.

Should solid waste pickup and disposal at Rolle Airfield be beyond the capabilities of YCAA maintenance services, these services could be contracted with the local service provider to place a dumpster at the Airport.

Electrical service at Rolle Airfield is non-existent. Again, providing this essential utility will be a matter of logistics and economics, as well as coordination between the YCAA, Yuma County, The City of San Luis, and the service provider, Arizona Public Service (APS).

If it is determined that natural gas or propane should be made available at the Airfield, like the previously discussed utilities it is a matter of feasibility and afford-ability, with the most cost effective solution being the most logical choice. Natural gas would require that the area service provider, Southwest Gas Corporation provide hookup service to the Airfield property. Propane on the other hand, could be provided with on-site storage tanks at the Airfield.

Phone service to the Airfield would be

provided by U.S. West Communications, and as with the other utilities will require coordination between the YCAA and the service provider as to the costs, logistics, and level of service which can be provided.

Each of the aforementioned utilities, with regard to their capacity, absence or limitation, necessary for the forecast development and efficient operation of Rolle Airfield will be considered when determining future airport master plan design alternatives.

OTHER FACILITIES

Since it has no future plans for scheduled airline flights, Rolle Airfield is exempt from Federal Aviation Regulation (FAR) Part 139 Standards, and is not required to have airport rescue and firefighting (ARFF) equipment on site.

Any new building construction at the Airfield, however, whether hangars or conventional structures must conform to applicable sections of the National Fire Protection Association (NFPA) code, the Uniform Fire Code and the Uniform Building Code, and is subject to inspection and approval of the State Fire Marshall's office. Specific hangar activities, such as aircraft repair and maintenance, may require the implementation of a fire suppression system at Rolle Airfield. The requirements for hangars used exclusively for aircraft storage are less stringent than those used for aircraft repairs and maintenance. A more comprehensive appraisal of future hangar activities may be required in order to conform to the above-mentioned codes. Any required fire suppression system should be designed to accommodate future expansion beyond that of presently proposed structures. Components of such systems may include storage tanks, piping, and/or a booster pump station. The exact design of such a system will be dependent on the Airfield's future water supply source.

CONCLUSIONS

Landside facility requirements are illustrated on **Exhibit 3B.** Given the potential number of based aircraft forecast in Chapter Two, 14 T-Hangar positions are required throughout the planning period. These 14 units could be contained in one structure, however, it is recommended that additional space be allocated in the form of a future T-Hangar reserve area should demand outweigh the forecasts for future based aircraft. Additionally, a combined (local and transient) total of six (6) aircraft tiedown positions are forecast to be required by the conclusion of the 20-year planning horizon. A total of 3,420 square yards of apron area is required to accommodate this single and multi-engine aircraft parking area. Facility requirements analysis based on data developed and presented in Chapter Two determined there is no forecast need for a future general aviation terminal given the predicted based aircraft and operations activity levels. It is recommended, however, as with any future conventional hangar/FBO facility, that a site be set aside for a future general aviation terminal facility should demand warrant its construction. Until such time, basic GA terminal facility functions can be provided within the previously discussed 14-unit T-Hangar facility. Additional planning considerations include paving of the Airfield access road from where it enters the property to the vehicle parking area. This 7,200 square foot, paved vehicle parking area is large enough to accommodate 18 vehicles. Though the need for a future fuel facility cannot be justified with the current forecast activity levels, again, it is necessary to reserve a future site should demand alter the current forecast situation. The location of a future aircraft wash

rack/maintenance facility site has also been reserved. The establishment of utilities essential to the future development of Rolle Airfield is strongly recommended and will require coordination between the YCAA, the City of San Luis, and Yuma County. In addition, it is recommended that the existing Airfield security/perimeter fencing be extended to enclose the proposed T-Hangar and aircraft parking apron areas. Signage indicating the presence and location of Rolle Airfield is recommended for installation on both access roads leading to the Airfield, on County 23rd St. to the south and west, and Avenue B to the north and east.

SUMMARY

The purpose of this chapter has been to identify the facilities required to meet potential aviation demands projected for Rolle Airfield throughout the 20-year planning horizon. The next step is to develop and analyze alternatives that can meet these projected needs. The following chapter will provide this analysis and recommend the best alternative for future development of the Airport.